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ABSTRACT

This study, using data from the National Study of Student Learning, examined whether participation in a collegiate work-study program was related to cognitive educational benefits. Data were collected from 2,485 entering students at 23 institutions nationwide in the fall of 1992 with follow-up in the spring of 1993, of whom 494 (19.9 percent) reported receiving work-study assistance. Two questions were tested: one concerned differences in college experiences of work-study and nonwork-study students; the other with the effects of any differences on students' cognitive development. The study found that participation in a work-study program appeared to have a negative influence on first-year gains in reading comprehension, but a positive influence on critical thinking skills; no effects on math abilities were identified. These effects were apparent even after taking into account selected precollege characteristics, including initial cognitive abilities. Three tables present detailed data on: (1) students' cognitive ability, (2) college experiences, and (3) interaction effects. (Contains 50 references.) (CH)

# WORK-STUDY PROGRAM INFLUENCES ON COLLEGE STUDENTS' COGNITIVE DEVELOPMENT

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# WORK-STUDY PROGRAM INFLUENCES ON COLLEGE STUDENTS' COGNITIVE DEVELOPMENT


## Abstract

This study examined whether participation in a collegiate work-study program was related to cognitive educational benefits. Data came from 2,485 students who entered 23 diverse institutions nationwide in Fall, 1992 and completed one year of study. Work-study students' college experiences differ from those of their nonwork-study peers in a variety of areas. Participation in a work-study program appears to have a negative influence on first-year gains in reading comprehension, but a positive influence on critical thinking skills. These influences are apparent even after taking into account selected precollege characteristics, including initial cognitive abilities. No effects on math abilities were identified.

## WORK-STUDY PROGRAM INFLUENCES

## ON COLLEGE STUDENTS' COGNITIVE DEVELOPMENT

Recent research on the learning outcomes of college indicate that students develop as a consequence of a wide variety of collegiate influences (Kuh, 1995; Pace, 1990; Pascarella & Terenzini, 1991; Terenzini & Pascarella, 1994). These influences originate not just in the formal curriculum (e.g., the courses students take) or the culture and activities of the classroom, but also in students' out-of-class experiences, as well as the structural and environmental characteristics of the institutions students attend. Work-study (WS) programs offer one possible way in which students' in- and out-of-class experience might be made to serve educational ends.

Funds to support work-study programs come from both state and federal sources, but the work-study program most familiar to college students, their parents, and administrators was created by the U.S. Congress as part of the Economic Opportunity Act of 1964 (United States Code, 1964). In March of 1996, President Clinton sent to Congress his Fiscal 1997 Budget Plan, calling for an appropriation of $679 million, a 10 percent increase over Fiscal Year 1995, to increase the number of students supported to one million (Burd, 1996). While the original legislation was silent on the potential educational benefits of WS employment, that concept has crept into the public understanding of the program's purposes. Merisotis and others (1995), for example, have called for modifications in the federal WS program so as to expand opportunities for student work that would be related in meaningful ways to students' declared educational and occupational goals. Others (e.g., Clark & Rinehart, 1982; Swift, 1990; Terenzini, Pascarella, & Blimling, 1996) have identified WS programs as potential opportunities to link students' academic and nonacademic experiences to promote learning.

Most studies of the educational impact of WS or other financial aid programs, however, have focused on their effectiveness in facilitating student access, performance, or persistence. With respect to access, the evidence quite consistently indicates that college work-study programs (like all other forms of financial aid) have been generally effective in promoting equal access to higher education for students from low-income families (McPherson, 1988; Miller & Hexter, 1985; St. John, 1990a; St. John & Noell, 1989; Washington State Higher Education Coordinating Board, 1991) and for students of color (St. John & Noell, 1989).

As with the research on access, studies of work-study and academic performance consistently indicate that student participation in a work-study program neither impedes nor promotes academic achievement when WS students are compared with their non-working peers (Barnes & Keene, 1974; Bella & Huba, 1982; Curtis & Nummer, 1991; Urahn & Nettles, 1987; Van de Water & Augenblick, 1987).

Most studies of the effectiveness of college work-study programs have focused on student persistence. Several investigations (e.g., Astin, 1993; Bella & Huba, 1982; Curtis & Nummer, 1991; Urahn & Nettles, 1987) found no differences in the persistence rates between work-study students and their non-working peers. The majority of persistence studies, however, report a positive relation between work-study participation and persistence (Astin, 1975; Astin & Cross, 1979; Carroll & Chan-Kopoka, 1988; Herndon, 1984a, 1984b; Stampen & Cabrera, 1986, 1988; St. John, 1990b; Voorhees, 1985; Wenc, 1983).

The reasons behind WS programs' success, however, are unclear. One line of argument is that WS assistance for low-income students levels the playing field. Stampen and Cabrera (1986, 1988), for example, report no difference in persistence rates between

work-study and non-working students. They conclude that the WS program participation promotes persistence by removing financial barriers that might otherwise have reduced persistence among low-income students. A second set of hypotheses suggests that WS programs promote persistence by increasing opportunities for student involvement in campus life and student interaction with faculty members and other professional staff members (Astin, 1975; Ehrenberg & Sherman, 1987; Stampen & Cabrera, 1988; Wenc, 1983).

A small number of studies report other positive educational benefits associated with work-study program participation. These benefits include higher levels of involvement with faculty and the learning environment (Ames, 1991; Aper, 1994; Urahn & Nettles, 1987), a finding consistent with the "greater involvement" hypothesis for the success of WS programs; clarification of educational and occupational goals (Roark, 1983; Washington State Higher Education Coordinating Board, 1991); opportunities to apply classroom learning in real-life situations (Ames, 1991; Roark, 1983); fewer problems in making the transition to full-time employment (Clark & Rinehart, 1982; Stephenson, 1982; Washington State Higher Education Coordinating Board, 1991), and higher starting wage rates (Stephenson, 1982). We identified no studies, however, that explored the relation between the work-study experience and cognitive development.

Because of the apparent potential for college work-study programs to promote students' academic and cognitive development, this study explored the possible relation between WS participation and educationally-desirable outcomes not previously examined. Specifically, the study sought answers to two questions: 1) Do work-study students' experiences during the first year of college differ from those of nonwork-study students?, and, if so, 2) are there consequences of those differences for the development of students' cognitive skills?

## Methods

### Conceptual Framework

The basic conceptual model for this study (see Figure 1) is longitudinal and draws upon many of the elements of recent conceptualizations of college impact (e.g., Astin, 1985; Pascarella, 1985; Tinto, 1975, 1987; Weidman, 1989). The model hypothesizes six sets of constructs defining a causal sequence that begins when students come to college with a wide array of educationally-relevant background characteristics (including level of cognitive development). These precollege characteristics are presumed to influence not only the outcomes of college directly, but also students' course-taking patterns, formal classroom experiences, and out-of-class experiences during college, which, in turn, also shape educational outcomes. The interplay between and among these sets of influences on learning takes place, of course, within a particular institutional context (e.g., organizational characteristics, policies, structures, and culture).

The present study is not a test of the validity of the causal structure of this model. The model does, however, serve two, useful purposes. First, it identifies those categories of variables that have potential for shaping educational outcomes (in this case, cognitive development). Second, it suggests a causal sequence that forms the basis of the analyses undertaken to answer Question #2 above. In addressing that question the study estimates the influence on first-year cognitive gains by those aspects of college (i.e., curricular, classroom, and out-of-class experiences, as well as selected institutional characteristics) on which college work-study participants and non-participants may differ. These estimates are made after taking into account certain of the precollege characteristics on which the two categories of students differ, including initial reading, math, and critical thinking abilities.

Institutional Sample

This study is part of the National Study of Student Learning (NSSL), a three-year longitudinal, national study of some 4,000 new students who, in the Fall of 1992, entered 18 four-year and 5 two-year colleges and universities nationwide. NSSL was conducted by the National Center on Postsecondary Teaching, Learning, and Assessment (NCTLA), a national research and dissemination center funded by the U.S. Department of Education's Office of Educational Research and Improvement (OERI).

Institutions were selected from the National Center on Education Statistics' Integrated Postsecondary Education Data System (IPEDS) database to represent differences in colleges and universities nationwide on a variety of characteristics, including institutional type and control (e.g., private and public research universities, private liberal arts colleges, public and private comprehensive universities, two-year colleges, historically black colleges), size, geographic location, commuter versus residential character, and the ethnic distribution of the undergraduate student body.

Student Sample and Instruments

The initial data collection was conducted in the Fall of 1992. Each of the 23 participating institutions was given a target sample size relative in magnitude to the respective sizes of the entering class at each institution. The overall target sample was 5,000 students. The overall obtained sample size (i.e., those students actually participating) in the Fall, 1992 data collection was 3,840, a participation rate of 76.8 percent. Insofar as possible, students at each institution were sampled randomly from among new students.

The initial data collection lasted approximately three hours. Students were advised that they were participating in a national, longitudinal study of student learning and would be paid

a $25 stipend for their participation. They were also advised that the information they provided would be kept confidential, would never become part of their institutional records, and that all that was expected of them was a good-faith effort on the test modules (see below) and a candid response to all other questionnaire items.

An NCTLA-developed precollege survey form gathered information on student demographic characteristics and background, as well as their aspirations, expectations of college, and orientations toward learning. Participants also completed Form 88A of the Collegiate Assessment of Academic Proficiency (CAAP). The CAAP was developed by the American College Testing Program (ACT) specifically to assess selected general skills typically acquired by students during the first two years of college (ACT, 1989). The total CAAP consists of five, 40-minute, multiple-choice test modules, three of which -- reading, math, and critical thinking -- were used in this study.

A follow-up testing of the sample took place in the Spring of 1993. This data collection required about three and one-half hours and included Form 88B of the CAAP, Pace's (1984) College Student Experience Questionnaire (CSEQ) to measure students' first-year experiences in college, and a specially-designed follow-up survey form assessing aspects of students' first-year experiences not covered by the CSEQ. Students were paid a second stipend ($35) for their participation. Of the original sample of 3,840 students who participated in the Fall, 1992 testing, 2,485 (64.7%) also took part in the Spring, 1993 data collection and responded to the set of financial aid items. Of these respondents, 494 (19.9%) reported receiving work-study assistance during their first year of college, and 1,991 (80.1%) reported receiving no work-study aid.

Given the high response rates at both testings, it is not particularly surprising that the sample was reasonably representative of the population from which it was drawn. Nonetheless, to adjust for potential response bias by gender, ethnicity, and institution, a sample weighting algorithm was developed. Specifically, within each individual institution, participants in the follow-up data collection were weighted so as to be representative of their institution's first-year population by gender (male or female) and ethnicity (white, Black, Hispanic, or other). The effect of applying sample weights in this manner was to adjust not only for response bias by gender and ethnicity, but also for differential response rates across institutions. Given the sampling plan that led to the selection of the 23 institutions in this study and the weighting of individual respondents within each institution, the weighted aggregate sample of 2,685 students is reasonably representative of the fall, 1992 national population of first-year students with respect to gender and ethnicity.

Variables

The dependent variables in the analyses for Question #2 were the Spring, 1993 scores on the CAAP reading, math, and critical thinking tests. The CAAP reading test contains 36 items that assess reading comprehension as a product of skill in inferring, reasoning, and generalizing. Passages cover topics in fiction, the humanities, the social sciences, and the natural sciences. The KR-20 internal consistency reliabilities for the reading test range between .84 and .86. The 35-item mathematics test measures a student's ability to solve mathematical problems encountered in many postsecondary curricula. The emphasis is on quantitative reasoning rather than formula memorization. The content areas tested include pre-, elementary, intermediate, and advanced algebra; coordinate geometry; trigonometry, and introductory calculus. The KR-20 reliability coefficients for the math test range between

.79 and .81. The critical thinking module is a 32-item measure of a student's ability to clarify, analyze, evaluate, and extend arguments. Each of four passages presents a series of subarguments that support a more general conclusion. Each passage is accompanied by a set of multiple choice questions. The KR-20 reliability coefficients range from .81 to .82 (ACT, 1989). In a pilot test with a sample of 30 college students, the CAAP critical thinking module scores correlated .75 with the total score on the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980).

Following the conceptual framework for this study, five sets of independent variables were developed. The first set contained seven precollege characteristics, treated as control variables in this study. This set of variables included students' gender, race/ethnicity (minority vs. nonminority), age, degree aspirations, parents' education, total family income, and students' precollege scores on either the CAAP reading, math, or critical thinking tests, as appropriate. Examination of the distributions of the nominal variables (e.g., race/ethnicity and gender) indicated that the limited skewness present was unlikely to bias regression parameter estimates.

Four additional sets of independent variables were developed, each operationalizing a portion of the conceptual framework shown in Figure 1. The curricular experiences variable set contained six indicators. These variables included the total number of credit-hours completed during the year, and the number of courses taken in five areas: arts and humanities, social sciences, natural sciences and engineering, mathematics, and preprofessional and technical. Students' formal academic experiences were reflected in 11 variables. This set included four CSEQ scales (library experiences, writing experiences, experiences with faculty members, and classroom learning). Also included were measures

reflecting participation in an honors program, studying with other students, hours per week spent studying, the extent of learning derived from other students, and several characteristics of the instruction received (promotion of systematic thinking, instructor feedback, and the perceived effectiveness of instruction).

Fourteen indicators assessed students' out-of-class experiences. This set included three CSEQ scales (art, music, and theater involvement; campus residence experiences, and experiences with clubs and organizations). Other variables reflected the extent of students' contacts with faculty members, perceptions of faculty members' concern for students and teaching, membership in a fraternity or sorority, participation in an orientation program, intercollegiate athletics participation, receiving encouragement from family and friends (two variables) to remain enrolled, hours per week working off-campus, confidence they had chosen the right college, attendance in a racial/cultural awareness workshop, and relations with peers.

The structural and contextual characteristics of students' institutions were evaluated by 10 variables. This set reflected whether the institution was public or private; two- or four-year; the degree of emphasis the institutional environment in five areas: 1) personal relevance and practical values; 2) academic and scholarly qualities; 3) vocational and occupational competence; 4) being evaluative, critical, and analytical, and 5) esthetic, expressive and creative qualities (these five items came from the CSEQ). Institutional indices also measured students' relationships with administrative personnel, perceptions of the administration's openness to student ideas and participation in governance, and awareness of discriminatory speech. (The metrics used to operationalize the college experience variables on which work-study and nonwork-study students differed are reported in Table 2.

Respondents were also asked whether they "receive(d) financial aid this past year" in the form of loans, grants or scholarships, or work-study ("yes" or "no" for each category of aid). The 494 students who responded "yes" to the work-study item constitute the target group in this study.

Analytical Procedures

The first step in the analysis involved a series of t-tests (for correlated groups) to determine whether work-study and/or nonwork-study students had made statistically significant first-year gains on each of the dependent variables (reading, math, and critical thinking). Ordinary least-squares (OLS) regressions were then used to examine whether any identified gains persisted after controlling for students' precollege characteristics (listed above).

To answer Question #1 (concerning differences between the groups in their college experiences), a series of four, setwise, hierarchical, OLS regressions with group membership as a dichotomous, dependent variable were performed. (OLS was used rather than discriminant function analysis because of the former's greater ease of interpretation and familiarity for most readers, and because of the mathematical equivalency of OLS with a dichotomous dependent variable and two-group discriminant function analysis.) Differences in the college experiences of the work-study and nonwork-study students were tested in each of the four areas listed above. Group membership was regressed separately on each of the four experience variable sets while controlling for the selected precollege characteristics. Whether a student had also received a loan and/or a grant or scholarship was also controlled. In the regression for any given set of college experiences, the other experience variable sets were not included so as not to mask the influence of any variable in the target set that might

be of practical or theoretical interest. The beta weights (standardized regression coefficients) were used to identify the specific experiences in each set on which the group differed significantly after controlling for precollege characteristics and all other variables in that same set.

In the analyses for Question #2 (whether group differences in college experiences had differential effects on first-year cognitive gains), three, setwise, hierarchical, OLS regressions (one for each dependent variable) were employed, each having three steps. In the first step, students' scores on one of the three CAAP tests (reading, math, or critical thinking, in seriatim) at the end of the first-year were regressed, first, on the precollege characteristics, including precollege score on the appropriate CAAP module (e.g., precollege reading score when reading was the dependent variable). Because this study sought to identify the unique contribution of work-study program participation to cognitive gains, and because of the practice of "packaging" work-study with other forms of aid (e.g., with grants and/or loans), two additional variables -- whether students also received grant or loan support (yes/no on each) -- were also included as control variables.

In the second step, the college experience variables (combined from all four influence areas) on which the groups differed (see analyses for Question #1) were entered. Finally, to test whether the college experiences on which the groups differed had differential educational effects for any of the three cognitive outcome variables, a set of cross-product interaction terms was entered (group membership x each of the college experience variables on which the two groups differed). If the addition of the set of interaction terms produced a statistically significant increase in the magnitude of the $R^2$ for the full, main effects model (i.e., the one containing all precollege characteristics and college experiences on which the

two groups differed), then the significance of the regression weights were examined to identify those interaction terms which indicated a non-chance, differential effect. Significant interaction terms were then plotted (using the unstandardized regression weights) to gain an understanding of the nature of the differential effects.

## Results

A shown in Table 1, both WS and NWS groups made statistically significant gains in reading comprehension during their first year. The gain among WS students (1.59 scale points), however, was three times that (.51) observed among nonwork-study students. More importantly, the year-end differences in reading skill between WS and NWS students persist even after taking into account precollege differences in gender, race/ethnicity, family education, parents' education, age, degree aspirations, and precollege reading skill level. In math skills, WS students showed a statistically significant, but small, increase (.26 scale points), while the NWS students' gains were non-significant. Neither group showed a significant gain in critical thinking.

### Question #1: Differences in College Experiences

As shown in Table 2, the two groups differed in at least one (and usually five or six) of the experiences in each of the four postmatriculation areas of the conceptual model shown in Figure 1. In their curricular experiences, the two groups differed only in the number of humanities and fine arts courses taken, with WS students more likely to enroll in such courses than NWS students.

The two groups also differed on 5 of the 11 academic experiences variables. With precollege characteristics and all other academic experience variables controlled, WS students (compared to NWS students) were slightly, but significantly, less likely to participate in an

honors program and scored slightly lower on the CSEQ Writing Experiences scale. This 10-item measure assesses the extent to which students use writing tools (e.g., a dictionary, thesaurus) to enhance their composition skills, invest time in drafting and revising a manuscript, or seek the assistance of other people or an instructor to improve writing skills. Work-study students, however, were likely to spend more time studying, to have more positive perceptions of the quality of the instruction they received, and to have more contact with faculty members. This latter finding is based on the CSEQ Experiences with Faculty scale, which reflects the extent of personal contact students have with faculty members for various academic and nonacademic reasons. The perceptions of teaching scale contains 12 items each tapping a dimension identified in the research literature as a characteristic of good teaching. Students were asked to report the frequency with which the instructors they had had during the year displayed each of those dozen characteristics.

Work-study and nonwork-study students differed to a statistically significant degree on six of the 14 variables reflecting students' out-of-class experiences. While controlling for precollege differences and all other variables in the out-of-class experience set, WS students (contrasted with NWS students) were significantly lower (by about half) in the number of hours worked off-campus. WS students, however, were more likely to participate in orientation, to receive encouragement from their families to continue their enrollment, to report more positive relations with their peers, and to report a higher degree of involvement in campus clubs and organizations. The regression analyses also indicated that, after controlling for all other variables in the out-of-class experience set, that WS students were somewhat less likely to belong to a fraternity or sorority. Preliminary t-tests, however, indicated no statistically significant difference on this variable, and the group means differ

only at the third decimal place. Thus, we do not attach any substantive significance to the statistically significant beta weight for this variable.

The two groups also differed at statistically significant levels on five of the ten variables reflecting their institutions' structural characteristics and environments. Work-study students (vs. NWS students) were significantly and substantially (about four times) more likely to be found on a private college campus. WS students were also likely to report more positive relations with administrative personnel and to view the environments on their campuses as emphasizing vocational and occupational competence. While the beta weights indicate that participation in a work-study program was significantly and negatively related to students' perceptions of the administrative openness on their campus and to their perceptions of the degree to which the environment at their school emphasized esthetic, expressive, and creative values, the group means on these two variables differ in directions opposite those suggested by the signs of the beta weights. Moreover, simple t-tests indicate nonsignificant differences between the means on these same two variables. Thus, we consider the signs and significance of the beta weights to be statistical artifacts, and we attach no substantive importance to them.

Question #2: Effects of Differences on Cognitive Development

Entry of the 17 cross-product interaction terms in the regressions on both reading and critical thinking produced a small, but statistically significant increments in the overall $R^2$s of .0063 ($p < .001$) and .0045 ($p < .017$) for reading and critical thinking, respectively. Addition of the interaction terms to the main-effects model for math yielded no statistically significant improvement in the model. These findings indicate that differences in the college experiences of WS and NWS students may be related to differential educational outcomes, at

least for reading and critical thinking skills.

Table 3 summarizes the nature and magnitude of the statistically significant interactions. For reading, two interaction terms were significant. The number of humanities and arts courses taken has a strongly positive effect for nonwork-study students, but a negative influence on reading skill development among WS students. Similarly, the number of hours per week employed off-campus had strong, negative influence on WS students, but a modest positive effect for NWS students.

Three interaction terms were statistically significant in the analyses of year-end critical thinking scores. As noted in the analyses for Question #1, WS students reported greater contact with faculty members than NWS students, but the interaction between group membership and faculty interaction suggests such contact has a negative effect on year-end critical thinking scores for both groups. That effect is more pronounced for WS students than their NWS peers. This finding is at odds with numerous other studies that report a positive relation between student-faculty contact and cognitive gains (Pascarella & Terenzini, 1991). Moreover, the zero-order correlations indicate small, but positive, relations between year-end critical thinking scores and both WS participation ($r = .106$) and the extent of student contact with faculty members (.026). Thus, the nature and statistical significance of this particular interaction term may be artifactual, and we are inclined not to place much confidence in it until it can be replicated.

Attending a private college or university had a positive influence on gains in CAAP critical thinking scores for both groups, but the impact was greater for WS than NWS students. Finally, students' relations with administrative personnel had a positive effect on first-year gains in critical thinking skills among WS students, but the effect was neutral (if

not slightly negative) among nonwork-study students. The meaning and implications of these interaction term results are discussed in the Conclusions section below.

Limitations

This study has several limitations. First, although the sample is multi-institutional and contains a broad range of two- and four-years institutions, the 23 colleges and universities were selected purposively and not at random. Thus, to an unknown degree, these institutions may not be representative of the national mix of colleges and universities.

Second, although attempts were made in the initial sampling design and subsequent weighting of respondents to yield a sample of students who, in the aggregate, would be representative of the national population of new students entering colleges and universities in the Fall of 1992, the time commitment and work required of each student participant undoubtedly led to some self-selection. One cannot be sure that those who were willing to participate in the study responded in the same fashion as would those who were invited but declined to participate.

Third, while the differences between the groups in their experiences of college (reflected in their beta weights) are statistically significant (perhaps due to the relatively large sample size), the magnitudes of those influences are comparatively small. The estimated effects sizes, however, may be at least partially constrained by measurement and analytical artifacts. First, many commercially-available instruments (such as the CAAP) are constructed so as to produce relatively stable measurements over time (Winter, 1979; Winter, McClelland, & Stewart, 1981), thus tending to underestimate the actual magnitude of change. Second, the estimates may be artificially low because of the high correlation between the precollege CAAP test scores for each learning outcome and their year-end counterpart scores

(pre- and post-year score correlations: reading = .75, math = .82, and critical thinking = .79). With each precollege measure (included as a control variable) explaining half or more of the variance in the dependent measure, differences in students' college experiences are limited in the amount of unexplained variance remaining for which they can account. Thus, despite the small effect sizes, the findings of this study must be considered at least suggestive of the dynamics of the impact of work-study program participation on cognitive gains and should probably be considered lower-bound estimates.

Fourth, while reading, math, and critical thinking are basic educational outcomes, they are certainly not the only dimensions along which students develop academically and intellectually during the college years. Moreover, alternative conceptualizations of the components of all three skill areas have been put forward, and the results might have been somewhat different had other measures of each skill area been used.

Fifth, students develop their reading, math, and critical thinking skills over time and at varying rates. This study is limited by the fact that changes in these cognitive skill areas were examined after only one year of college. Changes in these areas in subsequent years may be greater or smaller than those reported here, and the sources of influence on those gains may themselves vary over time.

Finally, work-study programs take different forms (e.g., some are federally supported while others are state-supported) and involve students in different kinds of activities depending on the needs of the unit in which a student works. Thus, no light can be shed on any differences in programs based on source of support, and it seems quite likely that certain kinds of work-study activities may enhance students' cognitive development more than others.

## Summary and Conclusions

A growing body of research indicates that students develop cognitively as a consequence of a variety of college experiences both inside and outside the classroom (Kuh, 1995; Pace, 1990; Pascarella & Terenzini, 1991; Terenzini & Pascarella, 1994). Work-study programs have been suggested by some writers as having considerable potential to link students' academic and nonacademic experiences to promote learning (e.g., Clark & Rinehart, 1982; Merisotis & Others, 1995; Swift, 1990; Terenzini, Pascarella, & Blimling, 1996). This study sought answers to two questions: 1) Do work-study (WS) students' experiences during the first year of college differ from those of nonwork-study students (NWS)?, and, if so, 2) what are the consequences of those differences for the development of students' reading, math, and critical thinking skills?

The evidence from this study indicates that both WS and NWS students made gains in reading skills during their first year of college. WS students' gains were three times greater than those of their NWS peers. WS students also showed modest gains in mathematics, but NWS students did not. Neither group gained significantly in critical thinking skills. These findings, then, tentatively suggest that the work-study experience may, indeed, be harnessed in the service of enhancing student learning.

Analyses undertaken to answer Question #1 indicated a number of differences in the two groups' college experiences. After controlling precollege differences (including initial scores on the three, cognitive measures), work-study students (compared to their NWS peers) were slightly (but significantly) less likely to participate in an honors program; they also scored slightly lower on a measure of their writing experiences. WS students, however, were likely to take more humanities and fine arts courses, spend more time studying, have

more positive perceptions of the quality of the instruction they had received, and have more contact with faculty members. This latter finding is consistent with those of Ames (1991), Aper (1994), and Urahn and Nettles (1987).

In their out-of-class experiences, WS (vs. NWS) students reported significantly fewer hours working off-campus (as one would expect), but were more likely to participate in an orientation program, receive encouragement from their families to continue their enrollment, report more positive relations with peers, and be more involved in campus clubs and organizations. Compared to their nonwork-study colleagues, work-study students were also more likely to attend a private college or university, report more positive relations with administrative personnel, and view the environment on their campus as emphasizing vocational and occupational competence.

Certain of the areas in which the two groups differ (e.g., frequency of faculty contact, fewer hours working off-campus, participation in an orientation program, more positive peer relations, and greater involvement in campus clubs and organizations) bespeak a greater level of campus involvement among WS students than among their NWS peers. Such involvement has been found by Astin (1993) and others (Pascarella & Terenzini, 1991) to be related to a number of educational benefits.

Analyses designed to reveal whether these experiential differences between the two groups in fact had cognitive consequences (i.e., to answer Question #2) indicated that certain college experiences did, indeed, produce small, but statistically significant, differential learning outcomes in reading and critical thinking, but not in math.

The interaction of WS/NWS with number of humanities and fine arts courses taken and the number of hours per week spent working off-campus produced statistically significant

differential effects on year-end reading scores. Both variables had a positive influence on reading gains among nonwork-study students, but a negative effect among work-study students. The combination of off-campus employment and WS participation had a particularly strong negative effect on reading skills. One possible interpretation may derive from the fact that time is a finite commodity and that WS assistance is the only form of financial support that makes certain time-demands on its recipients. It seems quite possible that work-study obligations -- particularly when combined with other, off-campus employment -- may restrict the number of hours [redacted] WS students have to devote to the reading required in courses (e.g., the humanities and fine arts) that may be more reading-intensive than those in other disciplines. Such an explanation, however, does not account for the positive influence off-campus employment appears to have on nonwork-study students.

Attending a private college or university had a positive influence on critical thinking skill development for both work-study and nonwork-study students, but the beneficial effects were particularly strong for students with a work-study assignment. One might speculate that, for reasons this study cannot explore, the WS experience for students on private campuses may be more likely to involve intellectually more meaningful tasks (ones requiring use of their critical thinking skills) than may be the case at typically larger, public institutions.

Finally, the evidence in this study suggests not only that work-study students are more likely than their nonwork-study peers to report positive relations with administrators, but also that those relations have a greater impact on critical thinking skills among WS students. It seems reasonable to suggest that, in their contacts with work-study students, administrators who are more "helpful, considerate, (or) flexible" may be functioning as teachers or mentors

in ways that promote critical thinking skills among students exposed to those administrators. Relations between nonwork-study students and administrators appear to be unrelated to critical thinking.

Legislators and writers have long known of some of the benefits of work-study programs for students and institutions alike. Work-study assignments provide students with financial support for their college educations, and institutions receive low-cost assistance for their on-going administrative needs. A number of studies (e.g., Astin, 1975; Carroll & Chan-Kopoka, 1988; Stampen & Cabrera, 1986, 1988; St. John, 1990b; Voorhees, 1985) also report finding work-study students are more likely than those without such assistance to persist in their enrollment, thereby benefiting both student and institution simultaneously.

As some have suggested (e.g., Clark & Rinehart, 1982; Swift, 1990; Terenzini, Pascarella, & Blimling, 1996), work-study programs may also offer opportunities to promote the educational and cognitive growth of students. The findings of this study clearly support that possibility. It seems reasonable to suggest that to the extent that students' work-study assignments can be linked to their academic work and/or require the use or development of academic and cognitive skills, the educational potential of work-study programs can be even greater. Regrettably, there is reason to believe that most work-study jobs tend to involve routine, low-level tasks, such as telephone answering and filing, often not directly related to the student's field of study (U.S. General Accounting Office, 1992). To the extent that work-study assignments involve only menial, intellectually low-demand tasks, those opportunities to promote cognitive development will be squandered.

## REFERENCES

American College Testing Program. (1989). Report on the technical characteristics of CAAP: Pilot year 1, 1988-89. Iowa City, IA: Author.

Ames, I. R. (1991, October/November). The work-study student as collaborator: The thrill of victory, the agony of defeat. Paper presented to the meeting of the Speech Communication Association, Atlanta, GA. (ERIC Document Reproduction Service No. ED 346 519)

Aper, J. P. (1994, April). An investigation of the relationship between student work experience and student outcomes. Paper presented to the meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED 375 750)

Astin, A. W. (1975). Preventing students from dropping out. San Francisco: Jossey-Bass.

Astin, A. W. (1985). Achieving educational excellence: A critical assessment of priorities and practices in higher education. San Francisco: Jossey-Bass.

Astin, A. W. (1993). What matters in college? *Four Critical Years* revisited. San Francisco: Jossey-Bass.

Astin, H. S., & Cross, K. P. (1979). Student financial aid and persistence in college. Los Angeles, CA: University of California at Los Angeles, Higher Education Research Institute. (ERIC Document Reproduction Service No. ED 221 978)

Barnes, J. D., & Keene, R. (1974). A comparison of the initial academic achievement of freshmen award winners who work and those who do not work. Journal of Student Financial Aid, 4, 25-29.

Bella, S. K., & Huba, M. E. (1982). Student part-time jobs: The relationship between type of job and academic performance. Journal of Student Financial Aid, 12, 22-27.

Burd, S. (1996, March 29). The president's priorities. The Chronicle of Higher Education, pp. A40-A41.

Carroll, C. D., & Chan-Kopoka, T. L. (1988). College students who work: 1980-84: Analysis and findings from *High School and Beyond*. (National Center for Education Statistics, Report No. CS-87-413). Washington, DC: U.S. Government Printing Office.

Curtis, G., & Nummer, C. E. (1991). To work or not to work: That is the question. Journal of Student Financial Aid, 21, 16-26.

Clark, D. M., & Rinehart, R. L. (1982). Structures and strategies for linking the higher education and employment communities. Higher Education/CETA Project Monograph. Washington, DC: American Council on Education. (ERIC Document Reproduction Service No. ED 223 175)

Ehrenberg, R., & Sherman, D. (1987). Employment while in college, academic achievement, and postcollege outcomes: A summary of results. Journal of Human Resources, 22, 1-23.

Herndon, S. (1984a). Factors that differentiate between persisters and dropouts among recipients of financial aid. Journal of College Student Personnel, 25,367-368.

Herndon, S. (1984b). Recent findings concerning the relative importance of housing to student retention. Journal of College and University Student Housing, 14, 27-31.

Kuh, G. D. (1995). The other curriculum: Out-of-class experiences associated with student learning and personal development. Journal of Higher Education, 66, 123-155.

McPherson, M. S. (1988). How can we tell if federal student aid is working? Washington, DC: College Entrance Examination Board. (ERIC Document Reproduction Service No. ED 2996 636)

Merisotis, J. P., & Others. (1995). The next step: Student financial aid for student success. Washington, DC: Institute for Higher Education Policy. (ERIC Document Reproduction Service No. ED 387 069)

Miller, S. E., & Hexter, H. (1985). How low-income families pay for college. Washington, DC: American Council on Education, Division of Policy Analysis and Research. (ERIC Document Reproduction Service No. ED 260 673)

Pace, C. (1984). Measuring the quality of college student experiences. Los Angeles: University of California, Higher Education Research Institute.

Pace, C. R. (1990). The undergraduates: A report of their activities and progress in college in the 1980s. Los Angeles: University of California--Los Angeles, Center for the Study of Evaluation.

Pascarella, E. T. (1985). College environmental influences on learning and cognitive development: A critical review and synthesis. In J. Smart (Ed.), Higher education: Handbook of theory and research (Vol. 1). New York: Agathon.

Pascarella, E. T., & Terenzini, P. T. (1991). How college affects students: Findings and insights from twenty years of research. San Francisco: Jossey-Bass.

Roark, M. L. (1983, March). Work on the campus: Benefits for student and

institution. Paper presented to the meeting of the American Personnel and Guidance Association, Washington, DC. (ERIC Document Reproduction Service No. ED 235 443)

St. John, E. P. (1990a). Price response in enrollment decisions: An analysis of the High School and Beyond sophomore cohort. Research in Higher Education, 31, 161-176.

St. John, E. P. (1990b). Price response in persistence decisions: An analysis of the High School and Beyond senior cohort. Research in Higher Education, 31, 387-403.

St. John, E. P., & Noell, J. (1989). The effects of student financial aid on access to higher education: An analysis of progress with special consideration of minority students. Research in Higher Education, 30, 563-581.

Stampen, J. O., & Cabrera, A. F. (1986). Exploring the effects of student aid on attrition. Journal of Student Financial Aid, 16, 28-40.

Stampen, J. O., & Cabrera, A. F. (1988). The targeting and packaging of student aid and its effect on attrition. Economic of Education Review, 7, 29-46.

Stephenson, S. P., Jr. (1982). Work in college and subsequent wage rates. Research in Higher Education, 17, 165-178.

Swift, J. S., Jr. (1990). Social consciousness and career awareness: Emerging link in higher education. ASHE-ERIC Higher Education Report No. 8, 1990. Washington, DC: George Washington University, Association for the Study of Higher Education and the ERIC Clearinghouse on Higher Education.

Terenzini, P. T., & Pascarella, E. T. (1994, January/February). Living with myths: Undergraduate education in America. Change, 26, 28-32.

Terenzini, P. T., Pascarella, E. T., & Blimling, G. S. (1996). Students' out-of-class experiences and their influence on learning and cognitive development: A literature review. Journal of College Student Development, 37, 149-162.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. Review of Educational Research, 45, 89-125.

Tinto, V. (1987). Leaving College: Rethinking the causes and cures of student attrition. Chicago: University of Chicago Press.

United States code: Congressional and administrative news. (1964). 88th Congress, Second Session, Volume 1: Laws and Legislative History (pp. 585-595). St. Paul, MN: West.

Urahn, S., & Nettles, M. T. (1987, February). Student financial aid and educational

outcomes: Is there a difference between grants and loans? Paper presented to the meeting of the Association for the Study of Higher Education, San Diego, CA.

U.S. General Accounting Office. (1992). Student financial aid: Characteristics of jobs provided through the college work-study program. (Report No. GAO/HRD-92-72BR). Washington, DC: U.S. General Accounting Office, Division of Human Resources. (ERIC Document Reproduction Service No. ED 343 541)

Van de Water, G., & Augenblick, J. (1987). Working while studying: Does it matter? An examination of the Washington State work study program. Olympia, WA: Washington State Higher Education Coordinating Board. (ERIC Document Reproduction Service No. ED 290 356)

Voorhees, R. A. (1985). Student finances and campus-based financial aid: A structural model analysis of the persistence of high need freshmen. Research in Higher Education, 22, 65-92.

Washington State Higher Education Coordinating Board. (1991). Washington State work- study: More than a financial aid program. Olympia, WA: Author. (ERIC Document Reproduction Service No. ED 368 244)

Watson, G., & Glaser, E. (1980). Watson-Glaser Critical Thinking Appraisal. San Antonio, TX: Psychological Corporation.

Weidman, J. (1989). Undergraduate socialization: A conceptual approach. In J. Smart (Ed.), Higher education: Handbook of theory and research (Vol. 5). New York: Agathon.

Wenc, L. M. (1983). Retention, attrition and student financial aid. In R. H. Fenske & B. P. Huff (Eds.), Handbook of student financial aid: Programs, procedures, and policies. San Francisco: Jossey-Bass.

Winter, D. (1979). Defining and measuring the competencies of a liberal arts education. In Current Issues in Higher Education (Vol. 5). Washington, DC: American Association for Higher Education.

Winter, D., McClelland, D., & Stewart, A. (1981). A new case for the liberal arts: Assessing institutional goals and student development. San Francisco: Jossey-Bass.

Figure 1. A conceptual model of student learning.

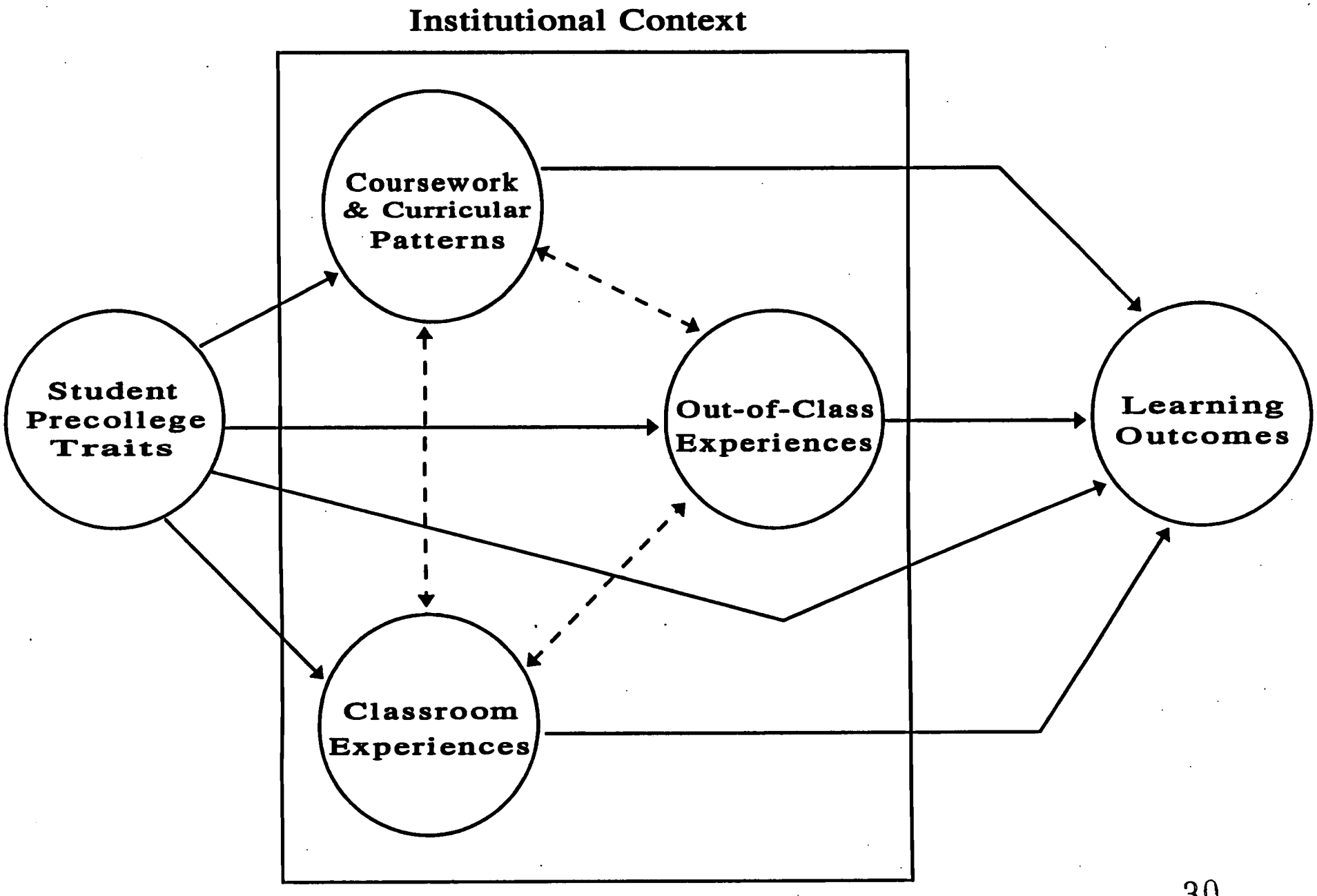

Table 1

Precollege and Year-End Scores for Work-Study and Nonwork-Study Students on Three Measures of Cognitive Ability

| Variable | Means | | SDs | |
|---|---|---|---|---|
| | WS (n=494) | NWS (n=1,991) | WS | NWS |
| Reading: | | | | |
| Precollege | 62.32[a] | 61.07 | 5.68 | 5.71 |
| End of Year | 63.91 | 61.58 | 5.39 | 5.87 |
| Pre-Post Change | p<.001 | p<.001 | | |
| Math: | | | | |
| Precollege | 58.99 | 57.76 | 4.87 | 4.76 |
| End of Year | 59.25 | 57.90 | 4.70 | 4.65 |
| Pre-Post Change | p<.05 | NS | | |
| Critical Thinking: | | | | |
| Precollege | 63.08 | 61.57 | 5.21 | 5.69 |
| End of Year | 63.26 | 61.68 | 5.56 | 6.18 |
| Pre-Post Change | NS | NS | | |

[a]All between group mean comparisons are significantly different at p<.001.

Table 2

College Experiences on Which Work-Study and Nonwork-Study Students Differ

| Variable Set/Item | Means | | SDs | | Beta Weights |
|---|---|---|---|---|---|
| | WS (n=494) | NWS (n=1,991) | WS | NWS | |
| Curricular Experiences | 3.0 | 2.23 | 2.48 | 2.01 | .10*** |
| No. of humanities and fine arts courses taken | | | | | |
| Academic Experiences | | | | | |
| Participated in an honors program (1 = yes, 0 = no) | .11 | .12 | .31 | .32 | -.09*** |
| Hours per week spent studying (1 = 6 or fewer to 6 = more than 20) | 3.73 | 3.37 | 1.32 | 1.32 | .06** |
| CSEQ Writing Experiences Scale | 2.52 | 2.53 | .63 | .62 | -.11*** |
| Perceptions of teaching received (12-item scale, 1 = never to 5 = very often) | 3.12 | 3.06 | .44 | .48 | .05* |
| CSEQ Experiences with Faculty Scale | 2.03 | 1.88 | .57 | .52 | .11*** |
| Out-of-Class Experiences | | | | | |
| Participated in orientation | .91 | .82 | .29 | .38 | .04* |
| Family encouraged continued enrollment (1 = strongly disagree to 5 = strongly agree) | 4.68 | 4.50 | .54 | .72 | .06** |
| Hours per week working off-campus (1 = none to 9 = more than 35) | 1.79 | 3.67 | 1.86 | 2.85 | -.13*** |
| Relations with student peers (7-item scale, 1 = strongly disagree to 5 = strongly agree) | 3.95 | 3.65 | .60 | .73 | .04* |
| CSEQ Clubs and Organizations Scale | 2.09 | 1.67 | .75 | .70 | .08*** |
| Belonged to a fraternity/sorority (1 = yes, 0 = no) | .08 | .08 | .27 | .27 | -.04* |

Table 2 (continued)

| Variable Set/Item | Means WS (n=494) | Means NWS (n=1,991) | SD WS | SD NWS | Beta Weights |
|---|---|---|---|---|---|
| Institutional Characterics | | | | | |
| Institution type: Private | .45 | .11 | .50 | .31 | .27*** |
| Relationships with administrators (1=rigid, impersonal, bound by regulations, to 9 = helpful, considerate, flexible) | 4.45 | 4.26 | 1.57 | 1.55 | .06** |
| Environment emphasizes vocational and occupational competence (1 = weak emphasis to 7 = strong emphasis) | 5.02 | 4.80 | 1.26 | 1.34 | .07*** |
| Administration's openness (4-item scale; 1= strongly disagree to 5 = strongly agree) | 3.39 | 3.44 | .71 | .74 | -.05* |
| Environment emphasizes esthetic, expressive, and creative qualitities (1 = weak emphasis to 7 = strong emphasis) | 4.87 | 4.76 | 1.30 | 1.26 | -.05* |

*p<.05 ** p<.01 ***p<.001

Table 3

Summary of Nature and Magnitude of Statistically Significant Interaction Effects

| Interaction Term: Group[a] x . . . | Reading | Critical Thinking |
|---|---|---|
| No. of humanities and fine arts courses | -/++[b] | |
| No. of hours per week working off-campus | --/+ | |
| CSEQ Experiences with Faculty scale | | --/- |
| Institutional type: Private | | ++/+ |
| Relationships with administrators | | +/0 |

[a]Coded 1 = Work-Study Student, 0 = Not Work-Study Student

[b] Work-Study/Nonwork-Study

++ = Strong positive effect

\+ = Positive effect

0 = No effect

\- = negative effect

-- = Strong negative effect

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